

Gas Inlet Sensor for Measuring Dust Particle Size Distribution and Concentration, Phase I

Completed Technology Project (2018 - 2019)



Project Introduction

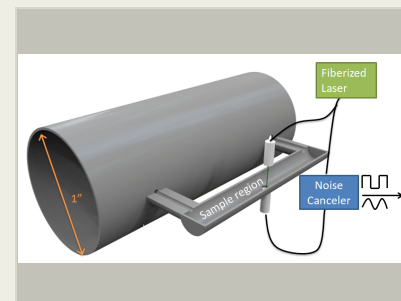
In-Situ Resource Utilization (ISRU) involves collecting and converting local resources into products that can be used to reduce mission mass, cost, and/or risk of human exploration. ISRU products that provide significant mission benefits with minimal infrastructure required are propellants, fuel cell reactants, and life support consumables. Production of mission consumables from in-situ Mars resources is enabling and critical for human exploration of the Mars surface and for minimizing the number and size of landers and the crew ascent vehicle. To understand both the dust concentration before filtration as well as the effectiveness of dust filtration techniques used in ISRU operations, NASA is interested in a dust sensor to measure 0.1 to 5 micron sized dust particles in the Mars atmosphere acquired for processing.

Southwest Sciences proposes to design, build, and demonstrate a novel non-intrusive optical particle measurement technology for measuring these particles under the NASA defined operating conditions. This in-line particle concentration/size monitor is based on a variant of laser intensity attenuation. The method is compact, low power, can be multiplexed to increase throughput and/or dynamic range, uses no consumable, and is independent of carrier gas, gas temperature and gas pressure.

Anticipated Benefits

The initial application of this proposed sensor, is for dust particle size and concentration measurements at the gas inlet of an ISRU system. The technology developed can be adapted to other planetary, small body, and terrestrial applications where non-invasive, sensitive, compact particle size and concentration measurements need to be made.

Potential applications in other government agencies include atmospheric aerosol/dust monitoring on both ground and airborne (manned/UAV/balloon) platforms within DOE, NOAA and EPA. Possible commercial markets include particle measurement systems for commercial and research use. In particular, this instrument would find commercial use in measuring atmospheric and environmental aerosols, as an industrial particulate pollution monitor, and in power plant feedback controls.



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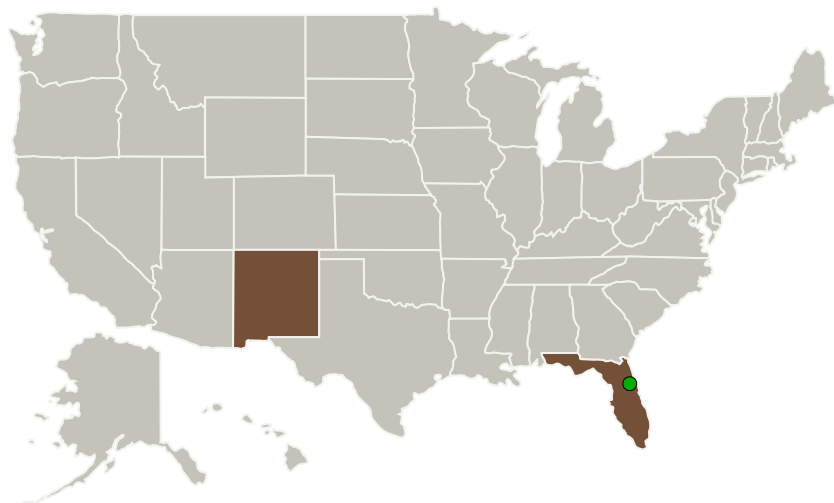
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Southwest Sciences, Inc.	Lead Organization	Industry	Santa Fe, New Mexico
● Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations

Florida	New Mexico
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Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141350>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Southwest Sciences, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

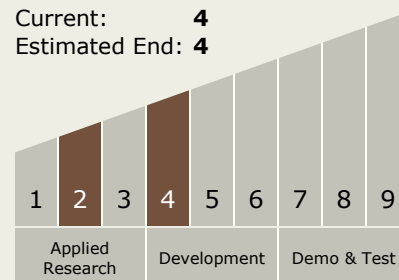
Carlos Torrez

Principal Investigator:

Anthony M Gomez

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4

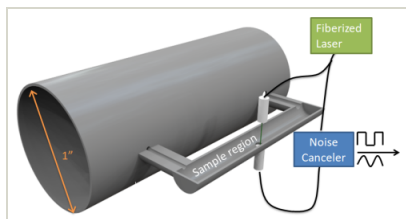


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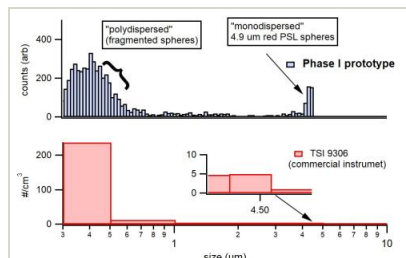


Images



Briefing Chart Image

Gas Inlet Sensor for Measuring Dust Particle Size Distribution and Concentration, Phase I
(<https://techport.nasa.gov/image/131052>)



Final Summary Chart Image

Gas Inlet Sensor for Measuring Dust Particle Size Distribution and Concentration, Phase I
(<https://techport.nasa.gov/image/135795>)

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.5 Particulate Contamination Prevention and Mitigation

Target Destination

Mars